



SCIE 2001 - Science 1: Teaching Methods for Primary

Assignment 1: Inquiry skills activities - 20%

[Participation (individual) - 5% + Recording of **ONE** activity (individual) - 15 %]

Instructions:

- Work in groups of four.
- Each group must do four activities.
- Discuss the questions in your group.
- Discussion will be guided by your lecturer.
- Each person should record the data and make notes on their discussion. This is necessary for your participation mark. You must be present and take an active part in all activities to receive your participation mark of the activity.
- Participation individual - 5%. (Marked by your lecturer through observation using a checklist in the laboratory and examination of your personal recordings).
- Each person will write up a report on **ONE** activity - 15 % (Marked by the lecturer in the group report. Rubrics for marking on pages 5 and 8 & 9).
- The group will submit a folder with the four activities. The names of the person responsible for the recording of the activity, their Student ID Number, phone contact and email must be put on the cover page of the report.

Activity	Name	Student ID Number	Phone	Email
Activity 1				
Activity 2				
Activity 3				
Activity 4				

- Special instructions will be given for submission if your lecturer prefers electronic submissions.



Activity 1

- **Title:** Circuit Puzzle as a Science Teaching Activity.
 - **Inquiry Question:** What are the connections hidden below the circuit board?
 - **Concept:** A closed circuit conducts electricity.
 - **How to carry out the investigation:** Using the circuit tester in front of you, try to make the bulb light by attaching the ends of the wire to lettered points on the circuit board.
 - **How to Present your results:** Record your observations in a tabulated form. Develop a table which is compact and not repetitive.
 - **Analysis of data:**
 1. From your results, draw a diagram to show how the aluminum foil might be arranged behind the flap.
 - **Conclusion:** Make a logical statement on the connections in your diagram.
 - **Use the following questions / statements to guide your discussions:**
 1. You used the skill of inferring in this activity. Define inferring and explain how you carried out the process
 2. Identify an intellectual attitude this activity promotes and justify your answer.
 3. Students raised the following question: Are all types of metals good conductors of electricity? They collected pieces of aluminium, steel, copper, iron.
 - i. Write a suitable hypothesis for this activity.
 - ii. State the manipulated, responding and at least three (3) variables held constant (controlled) for the activity.
 4. Discuss one error that may have contributed to erroneous results and how important it may have been in your activity.
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Activity 2

- **Title:** Mystery powder as a Science Teaching Activity
- **Inquiry Question:** What is the composition of the mystery powder?
- **How to carry out the investigation:** You have several powders in front of you - they are all different types of salts (you don't need to know their names). The Mystery Powder is a mixture of two of the powders. Carry out the tests and observations below, and see if you can determine which two powders have been mixed to form the mystery powder.
Observe each of the powders in front of you.



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Write a description of each one, using all your senses except taste and touch and be cautious when using smell.

Dissolve a little of each one in some water. Add enough water to make a solution, not a paste.

Describe what you observe.

To each solution of powder and water add a piece of red and a piece of blue litmus. Describe what happens. (Make sure you know what litmus is used to test and why it changes colour).

Empty the dishes and wash and dry.

Place a little powder in each dish, and add some vinegar (DO NOT ADD LITMUS TO THE VINEGAR MIXTURE). Describe what you observe.

- **How to Present your results:** Record all your observations using a table.
 - **Analysis of data:**
 1. From your results, try to explain how you can determine the nature of the mystery powder.
 - **Conclusion:** Make a logical statement on the nature of the mystery powder.
 - **Use the following questions / statements to guide your discussions:**
 1. Identify one process (other than observation) that is most prominently developed in this activity. Justify your answer.
 2. Identify an intellectual attitude this activity promotes and justify your answer.
 3. Students wanted to make a balloon rocket, by filling their balloons with gas from antacid tablets which fizz when dissolved in water. They raised the following question: do all antacid tablets create the same amount of fizz?
 - 3i. Write a suitable hypothesis for this activity.
 - 3ii. State the manipulated, responding and at least three (3) variables held constant (controlled) for the activity.
 - 3iii. What steps would the students' have to take so the activity may be considered a Fair test?
 4. Discuss one error that may have contributed to erroneous results and how important it may have been in your activity.
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Activity 3

- **Title:** Classification of Objects as a Science Teaching Activity.
- **Inquiry Question:** Can a common property be identified to classify the materials provided?
- **How to carry out the investigation:** Materials exhibit a wide range of properties which can be used as a means of identification and determination of their uses.

Materials - thumbtack, glass slide, seed, rubber band, test tube, paper clip, pin, pencil, one cent, wool strand, plastic twist tie, chalk and file card.

Carry out the following investigations, and record your findings:

1. Place the objects into two groups
 2. Design an appropriate but brief name for the groups.
 3. State the criterion you used to classify the objects.
 4. Record the results in an appropriately labelled and tabulated form with the elements of each group.
 5. Go back to Step 1 and regroup the elements into two new groups using a scientific criterion to classify the objects.
 6. Design an appropriate name for these two new groups.
 7. Record the results in an appropriately labelled table with the elements of each group.
- **How to Present your results:** Present the results of both classifications in appropriately labelled tables with the elements of each group.
 - **Analysis of data:**
 - From your results, try to determine whether you used scientific criteria in your first classification.
 - **Conclusion:** Make a logical statement on the use of scientific criteria in activities in science classes.
 - **Use the following questions / statements to guide your discussions:**
 1. What was the main science process in action in this activity?
 2. Identify one other process you used in this activity.
 3. Justify the choice(s) of process(es) you mentioned in (1) and (2) above?
 4. How might the same objects be classified in other subject areas, for example, art, craft, physical education, social studies, home economics, language, math, etc.?
 5. Discuss one error that may have contributed to erroneous results and how important it may have been in your activity.



The recording headings for the Fair test are slightly different. Please refer to that activity for the headings and rubric (pages 5 & 6).

Remember to use tables with appropriate headings, units and titles to record your results.

If needed, in the Method section, labeled diagrams can be used to illustrate the way in which apparatus was set up.

Heading	Criteria:		Mark	Awarded mark
Aim	Appropriate	1	1	
Apparatus	Appropriate	1	1	
Method	All steps are present	2	3	
	Some steps are present	1		
	Sequential order and clear language	1		
Results/Data	All pertinent data recorded	2	3	
	Some data recorded	1		
	Data organized in a table	1		
Analysis of data	Detailed analysis	2	2	
	Trivial analysis	1		
Conclusion	Logical	1	2	
	Based on data collected	1		
Discussion	Very detailed coherent and logical discussion with all questions discussed in detail	3	3	
	Some detail in a coherent and logical discussion with some questions discussed in detail	2		
	Little d discussion with few questions discussed in detail	1		
Participation	Recording of data in notebook for all 4 activities	2	5	
	Recording of discussion	1		
	Recordings are organized	1		
	Attendance	1		
Total			20	



Activity 4

Title: Designing and carrying out a fair investigation

Instructions:

Choose any one of the following questions, and design and carry out a fair test to answer the question.

1. For each question develop a hypothesis.
2. Test at least three brands or types.
3. Repeat your test twice.
4. Discuss your techniques for carrying out your tests with your instructor before proceeding.

4i. Does the brand of napkin determine the amount of water absorbed?

Apparatus - 3 beakers/plastic cups, 3 rubber bands, 3 measuring cylinders (25ml)

4ii. Do different brands of garbage bags differ in their strength?

Apparatus - 3 thumb tacks, two litre plastic bottle, string for tying (brought in by students), one 500 ml measuring cylinder (supplied by the laboratory)

4iii. Do inks of the same colour have the same composition?

Apparatus - Rubbing alcohol, 3 strips of filter paper same size in 3 test-tubes.

4iv. Does the shape of a sponge determine how much water it soaks up?

Apparatus - 3 large petri dishes/ plastic dishes/ bowls, 100 ml measuring cylinders, sponge.

4v. Does the diffusion of ink depend on the temperature of the water in which it is dropped?

Apparatus - 3 polystyrene cups, cold water, hot water, room temperature water, 1 thermometer, 1 small beaker for ink, 1 dropper, clock.

4vi. Does the size of the solute (e.g. sugar crystals) determine the rate at which it dissolves in its solvent (water)?

Apparatus - 3 beakers, 1 measuring cylinder, 1 thermometer, 1 small beaker, 1 plastic spoon, 3 stirrers. Sugar crystals can be made of different sizes by placing in a blender and grinding.

4vii. Does the rate at which a solute (salt, sugar, seasoning salt cubes) dissolve depend on the temperature of water?

Apparatus - 3 polystyrene cups - with ice water, warm water, room temperature, 1 measuring cylinders, 1 thermometers, 3 stirrers.



4viii. Is the stretch of a spring/rubber band proportional to the mass attached?

Apparatus - Weights increasing in mass of 20g up to 200 g, retort stand, ruler.

4ix. Is the force exerted by a moving trolley proportional to the mass of the trolley?

Apparatus - 2 trolleys, weights, block which trolley hits, ruler 1m

Recording the activity: Write up your investigation under the following headings: 15 marks.

1. Statement of the problem/Inquiry question - write your investigable question under this heading. 1 mark.
2. Hypothesis - written as a testable statement showing the relationship between two variables. 2 marks.
3. Manipulated, Responding and Variables held constant (at least 3). 3 marks
3. Rationale for hypothesis - describe your observations which led to this hypothesis. 1 mark.
4. Apparatus and/or materials 2 marks.
5. Method/Procedure, - Make your method as brief, but as complete logical and sequential as possible. Use past tense. You can use diagrams to support your description. 6 marks.
6. Results - use Tables with appropriate headings to record your observations. 3 marks.
7. Analysis of Results: - Explain the data trends. 3 marks
8. Conclusion - Show how the data trend supports or rejects the hypothesis. 1 mark.
9. Use the following questions / statements to guide your discussions: 6 mks
 1. Identify two basic skills used in this activity. Describe the behaviours that illustrated these skills.
 2. Identify at least one advantage of repeating an experiment.
 3. Science investigations always lead to more questions. Write a question that you may want to investigate based on observations from your fair test.
 4. Discuss one error that may have contributed to erroneous results and how important it may have been in your activity.
 5. How can you change your method to minimize the error your identified above?

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Heading	Criteria:		Mark	Awarded mark
Statement of the problem/Inquiry question	Written	1	1	
Hypothesis	Links two variables Testable	1 1	2	
Variables	Manipulated Responding Variables held constant (at least 3)	1 1 1	3	
Rationale for hypothesis	Evidence stated	1	1	
Apparatus and/or materials	All apparatus listed Diagram of apparatus	1 1	2	
Method	All steps are present Some steps are present Logical statements Sequential order Clear language Correct grammar and spelling	2 1 1 1 1 1	6	
Results/Data	All pertinent data recorded Some data recorded Data organized in a table	2 1 1	3	
Analysis of results	Explain the data trends in great detail Explain the data trends in little detail	2 1	3	
Conclusion	Logical and Based on data collected	1	1	
Discussion	Identify two basic skills Identify at least one advantage Question that you may want to investigate	2 2 2	6	

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Heading	Criteria:		Mark	Awarded mark
Overall report Presentation	Report - Neat and organized with all sections recorded	2	2	
	Report - Untidy with all sections recorded	1		
	Recording Subtotal		30	
	Recording Subtotal X 1/2		15	
Participation	Recording of data in notebook for all 4 activities	2	5	
	Recording of discussion	1		
	Recordings are organized	1		
	Attendance	1		
	Total		20	
Total = 20% of Grade				